REMARKS

By this amendment, claims 7, 15, 49, and 63 are cancelled and claim 50 is amended by rewriting it in independent form to recite the features of claim 1. No new matter is added by these amendments.

Claims 1, 3-6, 8-14, 16-34, 50-62, and 64-65 are pending in the application. Claims 6, 7, 19, 30, 61, 62, and 63 were rejected as indefinite under 35 U.S.C. §112, second paragraph. Claims 1, 6, 7, 50, and 51 were rejected as anticipated by *Harrison*; claims 1, 3, 5-16, 25-27, 33-34, and 49-50 stand rejected as anticipated by *WO 2004/068014* (*WO '014*); claim 3 stands rejected as obvious in view of *Harrison* and *Luppi*; claim 4 stands rejected as obvious in view of *WO '014* and *Moses et al.*; claims 8, 9, 17-24, 28-32, 51-58, 60, 61, and 62-65 stand rejected as obvious in view of *Harrison* and *Moses et al.*; and claim 59 stands rejected as obvious in view of *Harrison, Moses et al.*, and *Luppi*. Further examination of the application and reconsideration of the rejections are respectfully requested.

By way of background, Applicant's invention provides a method and apparatus to traverse a subsea topographic feature with a subsea pipeline including at least one *distribute*d buoyancy region. Distributed buoyancy is discussed in the specification at paragraph [0008], for example, and is readily distinguished from concentrated buoyancy devices. Distributed

buoyancy, for example, has the benefits of, in one embodiment, being a continuous coating of buoyant material which can simplify installation of the pipeline due to the elimination of any mounting system for a separate buoyancy attachment. Further, a distributed buoyancy region can shape the pipeline in an inverse catenary (emphasized in claim 50), further reducing stress and aiding in predicting and designing for stresses.

35 U.S.C. §112, Paragraph Two

Claims 6, 7, 19, 30, 61, 62, and 63 stand rejected as indefinite under 35 U.S.C. 112, second paragraph. Applicant has cancelled claims 7 and 63, mooting the rejection of these claims, and submits that none of the pending claims are indefinite as each claim "apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. §112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent." See *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000).

The office action alleges that as "claims 1 and 58 call for a first and second pipeline sections to be 'unbuoyed'; claims 6 and 62 cannot now call for the first and second pipeline sections to be buoyant." As noted in the specification at paragraph [0008], a distributed buoyancy region, as in claims 1 and 58, can include a plurality of added buoyancy modules or can

be a continuous coating of added buoyant material, for example. Added buoyant elements (e.g., the modules or continuous coating) are excluded from the first and second pipeline sections as noted by the term "unbuoyed" in claims 1 and 58.

Canceled claims 7 and 63 recited the limitation that *the first and second pipeline sections* (not the distributed buoyancy region) are positively buoyant, and claims 6, 19, 30, and 62 recite the limitation that the first and second pipeline sections are negatively buoyant. "Positively buoyant" refers to an element, here a first and second pipeline section, tending to *float* relative to a fluid in which the element is at least partially disposed; whereas "negatively buoyant", as in claims 6, 9, 30, and 62, refers to an element, here a first and second pipeline section, tending to *sink* relative to the ambient fluid.

As one of ordinary skill in the art can readily appreciate, the first and second unbuoyed pipeline sections can be positively or negatively buoyant without any buoyant elements *added* thereto so as to be considered "unbuoyed" as recited in the claims. A positively buoyant pipeline section might occur where the pipeline fluid is of a low density (e.g. a gas) and the weight of the pipe wall is less than the weight of water it displaces. An embodiment where the unbuoyed first and second pipeline sections are

negatively buoyant is disclosed at paragraph [0040] and shown in Fig. 2H. Unbuoy*ed* (i.e., no added buoyant elements) and negatively buoy*ant* (i.e., sinking relative to a fluid) have independent and well-understood meanings, and the claims are not indefinite.

Claim 61 is rejected as "confusing because claim 58 calls for 'unanchored' while claim 61 calls for a tether." Claim 58 recites the limitation that a distributed buoyancy region is unanchored, but does not limit the entire apparatus to being unanchored. Claim 61 recites the limitation of the apparatus including "a tether system to retain said pipeline in position and to resist forces of undersea currents." See paragraph [0031]. Applicant submits that claim 61 is not indefinite in light of claim 58 as it provides a clear warning to others as to what constitutes infringement of the claim. For example, under claim 61 a first and/or second unbuoyed pipeline section can include a tether attached thereto while the distributed buoyancy region itself remains unanchored.

Moreover, an anchor is understood in the art to refer to a heavy weight resting on a surface, e.g. the sea floor. A tether can be attached to a pile or other structure located on the sea floor, on the sea surface or intermediate the surface and sea floor, e.g. laterally offset from the pipeline to resist movement by a lateral current. Exclusion of an *anchored* distributed

buoyancy region does not exclude tethering of the pipeline by other means. The claims in question serve to fairly apprise one skilled in the art of the scope of the invention, and are not indefinite.

35 U.S.C. §§102-103

Harrison discloses a method for correcting an unsupported span by releasing the axial tension imparted during pipeline deployment using a temporary concentrated buoyancy device, i.e., a releasable buoy. Regarding claim 1, *Harrison* does not teach a distributed buoyancy region, but in sharp contrast shows a single buoy in Figure 4. As noted in the previous response, a single buoy cannot be said to anticipate the distributed buoyancy region in claim 1. Paragraph [0052] states that while a *distributed* buoyancy region can be "a *plurality* of buoys, it should be understood by one of ordinary skill in the art that various other distributed buoyancy systems, including, but not limited to, buoyant coatings, buoyant pipe, or buoyant half-shells, may be used." One skilled in the art readily appreciates that a single attachment point for one buoy is a concentrated buoyancy device and does not equate to a distributed buoyancy system. *Cf.* commonly assigned U.S. Patent 7,025,533 to Mungall et al. for "Concentrated Buoyancy Subsea Pipeline Apparatus and Method."

In sharp contrast, the portion or region of the pipeline which is

temporarily vertically deflected in *Harrison* is supported by a *single* buoy, not a distributed buoyancy region. A *portion or region* of the pipe is not itself buoyant as alleged by the office action, but merely *supported* by a single point of buoyancy (e.g., the buoy secured at a single attachment point), as evidenced by the shape of the pipeline 10 in Fig. 4.

The vertical deflection in *Harrison* is added to impart slack into the pipeline to remove axial tension when the pipeline is released onto the seabed. At 3/15-17 noting that, the "ideal situation is one where pipeline 10 *conforms* rather closely to the contours of seabed 16 as shown in FIG. 3 with no residual axial tension." *Harrison* teaches that no *portions or regions* of the pipeline include a distributed buoyancy region, as evidenced at 4/20-21 of the specification, further teaching the end result is a pipeline "closely conform(ed) to the contours of any undulating seabed 16." A distributed buoyancy region as in claim 1 cannot be conformed to the seabed as it is retained so as to *traverse* (e.g., not contact) a topographic feature.

Furthermore, claim 1 is specifically limited to a "constructed" pipeline that can carry fluids, not to a temporary structure that occurs only during the construction before fluids can be regularly pipelined. Harrison clearly teaches at (column/lines) 1/36-39 and 2/36-46 that the pipeline cannot be used without risk of damage like a rupture until the axial tension is relieved

by releasing the buoy and the spans are supported by the seabed. At 5/59-61, after the pipe is deflected to the required level, one "*disconnects* buoy 20 from pipeline 10. Buoy 20 then slowly rises to the surface for later recovery while pipeline 10 moves toward seabed 16."

Moreover, with respect to claim 50, the single buoy of *Harrison* does not provide a distribution of positive buoyancy needed to obtain an *inverse catenary*. A catenary results when a (uniformly negatively buoyant) flexible structure like a string or rope is supported at its ends; an inverse catenary requires positive buoyancy to be evenly distributed between the two ends. Instead, the negatively buoyant pipe in *Harrison* assumes the shape of either regular catenaries on either side of the buoy attachment, or arcs as defined by the stiffness of the pipe to resist collapsing or crimping at the single concentrated buoyancy device attachment.

WO '014 discloses an underwater bridge to support a pipeline. *WO '014* fails to disclose a distributed buoyancy region of a pipeline as recited in Applicant's claims. Element 6 is a bridging duct section and includes frame 25 for supporting a pipeline over a basin. See 3/33-4/2 and Fig. 1. It is noted that *frame 25 can include buoyancy members*, however Applicant does not claim a frame or other support, or the equivalent structure thereof, to attach a buoyancy member thereto. In sharp contrast, a distributed buoyancy

region of a pipeline does not obtain when a separate frame is used and the buoyancy is not imparted to the pipeline per se which remains negatively buoyant and rests or is supported on the frame. *WO '014* is a complicated frame and truss system to support the pipeline that merely teaches connecting buoyancy members to a *frame*, a sort of floating support structure like a bridge to provide neutral buoyancy. In *WO '014* the pipeline itself remains negatively buoyant, resting on the frame or otherwise supported thereby, and does not become buoyant to meet the recitation of a "distributed buoyancy region" in the present claims.

In contrast, Applicant's invention seeks to avoid the use of such support structures spanning the scarp, and the use of applicant's distributed buoyancy region of the pipeline would render the *WO '014* structure inoperable for its intended purpose.

As to claim 3, *WO '014* does not disclose any "plurality of discrete buoyancy-providing modules distributed along a length *of said pipeline*". *WO '014*. See 4/1-2. As to claim 27, Applicant submits that any buoyancy members added to the frame 25 are disclosed as providing *neutral* buoyancy (see 4/1-2), which is not *positively* buoyant as recited in claim 27. As to claim 50, *WO '014* does not disclose an inverse catenary section. The bridging duct section 6 is only taught as extending straight with no

curvature. Further, the structure taught in every embodiment of *WO '014* teaches away from having an inverse catenary section, at 3/30 noting the "*bending* and buckling of the duct section 6 is *prevented*."

Luppi fails to bridge the gap from *Harrison* to Applicant's claim 3. *Luppi* discloses a flexible riser system having a single buoy 5 with multiple cylinders (22-24) therein. As noted in paragraph [0023] of *Luppi*, the multiple cylinders (22-24) are provided to allow for variable buoyancy by selectively filling a cylinder with gas and/or water. The compartmentalization of a single buoy 5 cannot be said to teach or suggest a plurality of *discrete* buoyancy modules distributed over a length of said pipeline.

Further, at least one end of a riser by definition does not extend to the sea floor but to the surface, failing to meet the affirmatively recited requirement of claim 1 that both sections of pipeline extend from the sea floor. See *Luppi* paragraph [0017]. Neither *Harrison* nor *Luppi* teach or suggest a *plurality* of discret*e* buoyancy modules distributed over a length of a constructed pipeline to span a scarp or other seabed geologic feature.

Moses et al. fails to bridge the gap from *WO '014* to Applicant's claim 4. *Moses et al.* does not disclose a continuous coating of buoyant material, only a lone buoyancy element attached to a riser. See Figures 2-6. The

element 62 in Figs. 5-6 is a *single* concentrated buoyancy element as recited at 6/62 and thus is not a *distributed* buoyancy region. The buoyancy means disclosed in *WO '014* is a single buoy 36 connected to a frame 25 with a cable 37. It is not clear how, or why, the integrated single buoyancy element 62 of *Moses et al.* would be separated from rigid section 67 of riser and somehow connected to cable 37 and/or frame 25 without destroying the very inventive intent of *WO '014* teaching that the bridging duct section 6 is retained in a straight line, whereas the rigid section 67 of riser in *Moses et al.,* is curved as noted at 7/6-8: "the rigid pipe section 67 is preferably *curved or bent* around the buoyancy element 62 and terminates in two ends 68, 69." As the two references teach away from being combined, these references would not have made obvious Applicant's claim 4, and even if they were somehow combined, it is clear that Applicant's claimed invention would not obtain.

Moses et al. fails to bridge the gap from *Harrison* to Applicant's claims 8, 9, 17-24, 28-32, 51-58, 60, 61, and 62-65. As noted above, *Harrison* teaches disposing a pipeline into contact with a topographic feature, in sharp contrast to the spanning thereof. *Moses et al.* teaches a riser system with a buoyancy device for limiting the bending stresses in the riser. *Moses et al.* discloses at 3/67 to 4/2 that "the riser has an upper end coupled

to an offshore platform. Such platforms are typically drilling or production platforms." At least one end of the riser by definition does not extend to the sea floor, failing to meet the affirmatively recited requirement of claims 1 and 58 that *both* sections of pipeline extend from the sea floor. There are no references in *Moses et al.* to traversing topographic features and the figures only disclose a flat seabed.

Further, there is no suggestion in either of the references to form a combination thereof, as *Harrison* teaches a method to remove axial tension from a *pipeline* whereas *Moses et al.* teaches a *riser* system with a buoyancy device for limiting the bending stresses in the riser due to the movement of a surface platform or vessel (see 1/28-36). *Harrison* does not teach or suggest any issues with the temporary bending of the pipeline during the slack introduction step that would require the inclusion of a flexure control device. The references, alone or in combination, do not disclose traversing a topographic feature with a distributed buoyancy pipeline region between sections of the pipeline, on either side of the buoyant region, that lie on the sea floor.

As to claim 60, neither *Moses et al.* nor *Harrison* teach or suggest a distributed buoyancy region, much less one that comprises a continuous coating of buoyant material. *Harrison* and *Moses et al.* disclose at best a

single buoy. *Moses et al.* at 6/62 teaches element 62 in Figs. 5-6 is a "*single* buoyancy element" that attaches at a single point 57 of the vertical riser and thus is not a *distributed* buoyancy region laterally spanning a seabed geologic feature, but a lone buoy similar to the one taught in *Harrison*.

Luppi similarly fails to bridge the gap from *Harrison* and *Moses et al* to Applicant's claim 59 for the reasons discussed above. None of the references alone or in combination teach or suggest a plurality of discrete buoyancy modules distributed over a length of said pipeline to form a distributed buoyancy region as claimed.

Further examination of the application is respectfully requested. In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. If any issues remain that are appropriate for resolution by telephone interview, please contact undersigned counsel.

Respectfully submitted,

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